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Short communication

Coping with food cravings. Investigating the potential of a mindfulness-based intervention☆

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ABSTRACT

The present study examined whether mindfulness-based strategies can effectively reduce food cravings in an overweight and obese adult population. Individuals participating in a dietary group treatment for overweight received an additional 7-week manual based training that aimed to promote regulation of cravings by means of acceptance. The control group did not receive this additional training program. The results showed that participants in the experimental group reported significantly lower cravings for food after the intervention compared to the control group. The findings are discussed in terms of possible mechanisms like prevention of goal frustration, disengagement of obsessive thinking and reduction of automatic relations between urge and reaction.

Food cravings, defined as an intense desire or urge to eat a specific food (Weingarten & Elston, 1990) are not essentially pathological, but can nevertheless lead to a diverse range of negative outcomes. For instance, past research has demonstrated a relation between food cravings and the development of obesity (Schlundt, Virts, Sbrocco, & Pope-Cordle, 1993) and eating disorders (Mitchell, Hatsukami, Eckert, & Pyle, 1985). Establishing what constitutes effective food craving regulation can be therefore considered as an important challenge.

Coping with food cravings is often accomplished by means of control-based strategies such as suppression or distraction. These strategies aim to decrease the frequency and intensity of cravings and strongly rely on active self-regulation. Self-regulation has been identified as a process in which one attempts to reduce the discrepancy between a current state and a desired goal state (Carver & Scheier, 1981). A novel alternative to control-based craving strategies is acceptance-based strategies. Acceptance-based regulation entails an important aspect of mindfulness-based interventions. That is, individuals who practice mindfulness experience and accept their cravings fully without actively attempting to change, avoid or control them (Hayes, Strosahl, & Wilson, 1999). Acceptance involves a nonjudgmental attitude towards cravings and requires willingness to stay in contact with the uncomfortable, often negative feelings that accompany craving. In this respect, acceptance is fundamentally different from the self-regulation process underlying control-based strategies, since it is not primarily aimed at altering responses or inner states. It does not involve the reduction of a discrepancy between current and goal state. Instead, acceptance is aimed at promoting willingness to experience the current state, the craving, without acting upon it.

Recently, a treatment study by Tapper et al. (2009) illustrated the potential of applying acceptance-based practice in the context of eating behaviour. Participants who actively engaged in a mindfulness-based weight loss intervention showed greater reductions in BMI and greater increases in physical activity than control participants. Today, however, only few studies have addressed the effectiveness of acceptance as a strategy to cope with food cravings specifically. A study by Forman et al. (2007) showed that for participants who were highly susceptible to the presence of food, acceptance was more effective in reducing food cravings compared to control-based strategies such as distraction and cognitive restructuring. However, acceptance was found to cause greater cravings among those with the lowest susceptibility to presence of food. Moreover, a recent study by Alberts and Papies (2010)[1] showed that hungry participants who were instructed to accept their cravings during exposure to tempting food, reported significantly higher cravings compared to those who suppressed their cravings. At first sight, these findings may seem incompatible with the positive effects of acceptance-based coping found in other domains such as social anxiety (Goldin, Ramel, & Gross, 2009), depression (Coelho, Canter, & Ernst, 2007) and chronic pain (Vowles, Wetherell, & Sorrell, 2009). It has to be noted however, that most studies highlighting the benefits of acceptance concern interventions with several sessions. In contrast, studies on acceptance and food cravings so far have only used single session interventions and did not involve training. Since acceptance

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requires people to overcome the automatic tendency to avoid internal states such as negative emotions, thoughts or bodily sensations (Hayes et al., 1999), repeated and more extensive exercise may be necessary in order to successfully acquire this skill (Oaten & Cheng, 2006). The present study was designed to address this issue and tested whether food cravings can be reduced by training acceptance-based regulation. In doing so, a training program was developed that used mindfulness-based strategies to increase awareness of food cravings and foster willingness to accept these cravings. This program consisted of an instruction manual that required participants to work through independently.

Method

Participants

A total of 19 participants (2 men; aged from 28 to 74, $M = 51.88$, $SD = 12.76$) participated in the study. Participants enlisted for a dietary group treatment for overweight and obesity in a Dutch community Centre (GroeneKruis Domicura, "Green Cross Care"). The mean weight of the participants was 85.4 kg ($SD = 14.2$; range 68.1–116.8) and the mean body mass index (BMI) was 31.3 ($SD = 4.1$; range 25.3–40.9). All participants received the same dietary treatment. This treatment consisted of 10 weekly meetings of 1.5 h each. During these meetings, information on healthy food choices was provided by a dietician. After receiving this information, participants also performed physical exercise for 1 h. In addition to this standard treatment, the experimental group ($n = 10$) received a 7-week manual based training that aimed to teach regulation of cravings by means of acceptance. Participants were randomly assigned to one of the two groups. The control group did not receive this additional training program. The experimental and control group did not differ significantly with respect to age, $t(17) = 1.90$, $p = .08$, weight, $t(17) < 1$ (M experimental group = 86.86, $SD = 17.04$, control group = 83.86, $SD = 10.12$), or BMI, $t(17) = 1.15$, $p = .27$ (M experimental group = 32.51, $SD = 5.96$, control group = 30.01, $SD = 2.35$). In order to gain insight in the dieting behaviour of participants, they completed a Dutch version of the Restraint Scale before onset of the intervention period (RS; Herman & Polivy, 1980). The RS is a 10-item questionnaire that assesses dieting and weight fluctuation. Scores on the Restraint Scale can range from 0 (least restrained) to 35 (most restrained). No significant differences in RS score between both groups were found, $t(17) < 1$ (M experimental group = 13.60, $SD = 3.06$, control group = 14.77, $SD = 5.36$). The study was approved by the standing ethical committee of the Faculty of Psychology and Neuroscience (Maastricht University).

Materials

Instruction manual

To train participants' acceptance skills, a manual was constructed, consisting of 8 chapters. The first chapter was an introduction that provided participants with general information on acceptance. The remaining 7 chapters focused on the implementation of acceptance and each chapter referred to a specific week of the intervention. During the first 3 weeks, the 'body scan' was introduced. In this technique, attention is brought to each area of the body, starting with the toes and moving up to the top of the head. Performing the body scan helps to increase awareness and acceptance of bodily sensations, including hunger, satiety and craving related cues (Baer, Fischer, & Huss, 2005). Week 4 focused on increasing awareness of eating behaviour and craving related thoughts by means of general mindfulness meditation (Kristeller & Hallett, 1999). During these exercises, participants learned to become aware of thoughts. They were instructed to accept whatever arises in the mind, without judging it or identifying with the content of it. By observing, rather than identifying with thoughts, one can experience their transient nature and learn that they eventually will fade. In this way, participants not only learned to notice food related thoughts, but also to observe and accept them without acting upon them. Finally, weeks 5–7 focused on the total experience of food cravings by practicing awareness and acceptance of both bodily sensations and thoughts related to these cravings. During these weeks, participants learned to decrease reactivity with regard to cravings. Whenever they experienced food cravings, they were thought to not immediately give in to the urge to consume food, but rather focus on and accept the bodily sensations and thoughts that accompany this urge. The primary aim of this approach was not to limit food intake, but to increase awareness of the automatic pattern that usually emerges in case of food cravings. The structure of each week was kept as consistent as possible and contained three components: a short example, an exercise and background information on the exercise.

MP3-player

In order to facilitate practice, participants received a portable MP3-player. This player contained instructions on how to perform the body scan, meditation and deal with food cravings or thoughts about food cravings in an accepting manner.

Daily e-mail

In order to enhance commitment, participants in the experimental group received a daily e-mail. This daily mail contained quotes about acceptance-based craving regulation.

Procedure

Before participants signed the informed consent, the experimenter provided general information on the content and requirements of the intervention. More specifically, participants in the experimental condition received information on acceptance and were told that the study required them to use the instruction guide on a daily basis and complete a questionnaire twice. Participants in the control condition were only told that they had to complete the questionnaire at two time points. When participants agreed to participate, they received the first questionnaire. The acceptance intervention started 3 weeks after the start of the standard treatment. Both groups received the first questionnaire (pre-test) after the third week of the standard treatment. Also, at this point in time, the weight of participants was recorded. Seven weeks later, all participants received the second questionnaire (post-test) and their weight was measured again.

Measures

Weight

Weight (kg) was recorded by the dietician at pre- and post-test. Participants were weighed in street clothes, without shoes.

General Food Craving Questionnaire

Food cravings were measures by means of a Dutch version of the General Food Craving Questionnaire Trait (G-FCQ-T). The G-FCQ-T is a reliable and valid 21-item self-report measure of a general 'desire for food' or 'desire to eat' (Cronbach's $\alpha = .94$) (Nijs, Franken, & Muris, 2007) consisting of the following four subscales (1) preoccupation with food (i.e., obsessively thinking about food and eating), (2) loss of control (i.e., experiencing difficulties in regulating eating behaviour when exposed to food cues), (3) positive outcome expectancy (i.e., believing eating to be positively reinforcing), and (4) emotional craving (i.e., the tendency to crave food when negative emotions are present). Participants were asked to rate how frequently each statement 'would be true for you in

general' using a six point scale ranging from 1 ('Never' or 'Not Applicable') to 6 ('Always').

Participation check

After the intervention, participants in the experimental condition were asked to indicate how much time on average they spent per day on the exercises.

Results

Participation check

All participants in the experimental condition ($n = 10$) reported to have completed the exercises on a daily basis. On average, participants indicated that they spend 7.6 min ($SD = 4.7$; range 1–15) per day on the exercises during the 7 weeks.

Weight

A repeated-measures ANOVA with measurement time as a within subjects factor (2 levels; pre-test and post-test) and condition as a between subjects factor was carried out to assess differences in weight loss between groups. Only a significant main effect of measurement time emerged, $F(1, 17) = 17.54$, $p < .01$, $\eta^2 = .51$, indicating a decrease of weight at post-test, in general. Within group comparisons showed a significant reduction in weight for both participants in the control condition, $t(8) = 2.42$, $p = .04$, $d = .12$ (M difference = 1.11, $SD = 1.38$) and those in the experimental condition, $t(9) = 3.51$, $p < .01$, $d = .12$ (M difference = 1.92, $SD = 1.73$).

Food cravings

A repeated-measures ANOVA with measurement time as a within subjects factor (2 levels; pre-measurement and post-measurement) and condition as a between subjects factor was used to assess differences in food cravings between the conditions. First, we compared the total score on the G-FCQ-T of both groups. This analysis revealed a significant interaction effect of condition and score on the G-FCQ-T, $F(1, 17) = 8.02$, $p = .012$, $\eta^2 = .32$. Within group comparisons revealed no significant difference in G-FCQ-T score between the pre- and post-measurement of the control group, $t(8) = .90$, $p = .39$ (M pre-measurement = 2.90, $SD = .65$, M post-measurement = 3.08, $SD = .69$). In contrast, participants in the experimental condition reported a significantly lower amount of cravings at the post-measurement, $t(9) = 3.20$, $p = .01$ (M pre-measurement = 3.06, $SD = .63$, M post-measurement = 2.48, $SD = .62$). In other words, whereas the craving of control participants remained relatively stable over time, the experimental group showed a significant decrease in cravings.

Next, we analysed the four subscales of the G-FCQ-T. A significant interaction effect of condition and score was found for the subscales "preoccupation with food", $F(1, 17) = 5.21$, $p = .036$, $\eta^2 = .24$, "loss of control", $F(1, 17) = 6.45$, $p = .021$, $\eta^2 = .28$, and "positive outcome expectancy", $F(1, 17) = 11.71$, $p < .01$, $\eta^2 = .41$. For the latter, also a significant main effect was found, $F(1, 17) = 57.36$, $p < .01$, $\eta^2 = .77$. No significant interaction effect was observed for "emotional craving", $F(1, 17) = 2.16$, $p = .16$. Within group analyses revealed that the control group did not report a difference between the pre- and post-measurement for the subscales "preoccupation with food" and "loss of control"(all $ps > .49$). However, participants in the control group did report a significant decrease in positive outcome expectancy, $t(8) = 2.37$, $p = .045$, $d = 2.96$. In addition, the experimental group reported a significantly lower score on the post-measurement in comparison to the pre-measurement for the subscales "preoccupation with food", $t(9) = 2.74$, $p = .023$, $d = 2.27$, "loss of control", $t(9) = 2.93$, $p = .017$, $d = 3.02$, and "positive outcome expectancy", $t(9) = 10.37$, $p < .001$, $d = 8.27$. Note, however, that although both the control group and the experimental group reported a lower positive outcome expectancy, the latter exhibited a significantly stronger decline than the first mentioned group, $F(1, 18) = 11.71$, $p < .01$, $\eta^2 = .41$ (M control = 3.17, $SD = 1.16$, M experimental = 2.52, $SD = 1.01$). All means are summarized in Table 1.

Discussion

The present findings provide support for the effectiveness of acceptance as a strategy to reduce food cravings. Participants who were exposed to a 7-week acceptance-based craving intervention reported significantly lower food cravings compared to participants who did not receive this training. More specifically, acceptance was found to reduce the extent to which participants experienced loss of control when exposed to food cues. This finding is not only practically relevant, but interesting from a theoretical point of view as well. After all, acceptance requires one *not* to control cravings, which paradoxically leads to higher levels of perceived control. This finding may be explained in terms of goal frustration (Boekaerts, 1999). Obviously, the goal of controlling one's cravings is to reduce the negative experience of cravings. The formation of this goal state can motivate people to alter their current state, but at the same time can result in frustration when attempts to reach this goal state are unsuccessful. For instance, one may experience rebound effects or notice a decrease in craving that is not as profound as intended. In these cases, one is confronted with the inability to successfully control one's cravings, which may cause frustration and contribute to a lack of perceived control. Since acceptance does not involve reaching a goal state, goal frustration as described above is less likely to occur. In addition, since acceptance requires one to face instead of avoid cravings, it can be regarded as a form of exposure. Experiencing that one is capable of not (immediately) giving in to the urge to consume desirable food may provide a sense of personal mastery and at the same time challenge irrational thoughts and beliefs about one's ability to regulate food intake (e.g. "I cannot stop eating until the bag is empty").

Acceptance was also found to cause a decrease in preoccupation with food. Participants who were exposed to the intervention reported that they less obsessively thought about food and eating. Research has shown that dieters and high restraint eaters think more

Table 1
Means and standard deviations of scores on the four subscales of General Food Cravings Questionnaire Trait.

Subscale	Control group		Experimental group	
	Pre-measurement	Post-measurement	Pre-measurement	Post-measurement
Preoccupation with food	2.65 (.24)	2.82 (.21)	2.92 (.23)[1]	2.43 (.20)[1]
Loss of control	3.13 (.20)	3.24 (.24)	2.95 (.19)[1]	2.33 (.22)[1]
Positive outcome expectancy	4.40 (.50)[1]	3.24 (.24)[1]	5.9 (.47)[2]	2.84 (.23)[2]
Emotional craving	2.86 (.36)	3.0 (.39)	3.0 (.34)	2.48 (.37)

Note: Numbers represent mean scores on each of the four subscales of the G-FCQ-T. Standard deviations are given in parentheses. Means within a row with the same superscript concern within group comparisons that differ significantly at $p < .05$.

dichotomously compared to non-dieters (e.g. "good" low caloric food versus "bad" high caloric food) (Polivy & Herman, 1985). This dichotomous thinking is likely to enhance obsessive processing by stimulating feelings of guilt after consumption of "forbidden" food (Dewberry & Ussher, 2001) and by increasing the attractiveness of forbidden food (Mann & Ward, 2001). Part of the present intervention was directed towards dealing mindfully with obsessive (food related) thoughts. Through practice, participants learned to disengage from ruminative or obsessive processing by observing thoughts, rather than perceiving them as personal or true. Consequently, their dichotomous and obsessive nature may have decreased, a finding that has been established in the field of obsessive compulsiveness as well (Hanstede, Gidron, & Nyklícek, 2008).

The strongest reduction was observed for positive outcome expectancy. After the mindfulness intervention, the perceived reinforcing value of food was rated significantly lower than before the onset of the intervention. Food consumption is frequently reinforcing simply due to the immediate gratification in terms of positive affect (Berridge & Robinson, 2003) or anticipated relief (Cooper, Wells, & Todd, 2004). Because individuals have learned to satisfy the urge to consume the desired food over time, they have typically not learned that cravings will dissolve on their own or that the sought after effects can be accomplished by means different than food consumption. The present practice aimed to facilitate tolerance of cravings. In this way, the automatic relation between urge and reaction is counteracted, a process which is likely to have lowered the reinforcing value of food. However, it has to be noted that the control group, who was only exposed to the standard dietary treatment program, reported a decline in positive outcome expectancy as well. Although this decline was not as profound as observed for the mindfulness group, it suggests that at least a part of the reduction in expectancy was caused by the standard dietary treatment program. The standard treatment program, which required participants to limit their food intake, may have also affected the automatic relation between urge and reaction. After all, not giving in to the urge to eat desired food does not only interrupt the automatic association between this urge and the standard reaction (consumption), it also stimulates replacement by alternative reinforcing or distracting activities. In sum, although the reduction in positive outcome expectancy could not be exclusively attributed to the mindfulness intervention, the present findings illustrate that adding acceptance-based coping to a standard dietary treatment does have additional value in terms of strengthening this reduction.

Finally, no difference between the control and the intervention group was found for emotional craving. Although emotions do play an important role in the generation and maintenance of food cravings (Cooper & Bowskill, 1986), for ethical reasons the present intervention did not incorporate emotions. Because acceptance requires emotions to be experienced fully, we reasoned that exposing participants to an unforeseeable diversity and severity of emotions would require guidance by a trained professional. Since such guidance was unavailable, we decided not to address emotions in the current intervention. This omission of emotions can explain the observed absence of differences in emotional craving. Previous research findings, however, suggest that increasing acceptance and mindfulness-based attention to emotions may help to counteract emotional craving. For instance, a study by Moon and Berenbaum (2009) revealed that low levels of attention to emotion were associated with higher levels of emotional eating.

Although the present findings are promising, some limitations remain. First, it has to be noted that the sample size was relatively small. Second, although the instruction guide was designed as simple and straightforward as possible, participants indicated that face to face contact would have been a valuable addition to the intervention. Including weekly meetings that would enable participants to practice under the supervision of a trained professional may enhance commitment and understanding, thereby further increasing the effectiveness of the intervention. Third, although participants were randomly allocated to the conditions, they were not blind to group allocation and the nature of the present intervention. Therefore, treatment bias may be possible and had some effect to internal validity of our study. The inclusion of the daily mails may have also contributed to this possible bias. Finally, more information on the effectiveness of the current intervention in relation to other interventions could have been provided if the intervention was compared with an intervention based for example on control techniques. By addressing the aforementioned concerns, future research may help to further illuminate the potential of a paradoxical, but promising approach to food cravings.

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